

REMARKS

Applicants request favorable reconsideration and allowance of the subject application in view of the preceding amendments and the following remarks.

Claims 51-61 are presented for consideration. Claim 51 is the sole independent claim. Claims 28, 33, 34, 38-41, 43, 44, 46 and 48 have been canceled without prejudice or disclaimer. Claims 51-53 have been amended to clarify features of Applicants' invention, while claims 56-61 have been added to recite additional features of the invention. Support for these changes and claims can be found in the original application, as filed. Therefore, no new matter has been added.

Applicants request favorable reconsideration and withdrawal of the rejections set forth in the above-noted Office Action.

Claims 28, 33, 34, 38-41, 43, 44, 46, 51, 52, 54 and 55 were rejected under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 5,424,552 to Tsuji et al. in view of U.S. Patent No. 5,179,273 to Lisson et al. Claims 48 and 53 were rejected under 35 U.S.C. § 103 as being unpatentable over the Tsuji et al. patent in view of the Lisson et al. patent and further in view of U.S. Patent No. 5,218,471 to Swanson et al. Applicants submit that the cited art, whether taken individually or in combination, does not teach or suggest many features of the present invention as previously recited in claims 28, 33, 34, 38-41, 43, 44, 46, 48 and 51-55. Therefore, these rejections are respectfully traversed. In addition, Applicants submit that the cited art does not teach many features of the present invention, as recited in independent claim 51, as presented.

Independent claim 51 recites an optical system for forming an image of a pattern formed on a reticle, upon an object to be exposed. The optical system includes an optical element that is able to be deformed by the weight thereof, and at least one aspherical surface effective to reduce a change in optical performance of the optical system due to deformation of the optical element as the optical lens element is provided in the optical system. The optical element and the at least one aspherical surface are disposed between the reticle and the object to be exposed.

Applicants submit that the cited art, whether taken individually or in combination, does not teach or suggest such features of the present invention, as recited in independent claim 51.

The Tsuji et al. patent relates to a projection exposure apparatus for detecting a state of focus at two or more places in an exposure region of a projection optical system by a focus state detection device. In accordance with the result of the detection, the image forming characteristics of the projection optical system are measured by an image forming characteristics measuring device. A first pattern extending in the sagittal direction and a second pattern extending in the meridional direction are formed so that the focus state is measured by light beams transmitted by these patterns.

The Tsuji et al. patent seeks to overcome a problem in which tilt or distortion of an image plane is caused by deformation of a reticle R. Optical elements 40, 41, 43 and 45 prevent tilt or distortion of the image plane even if the reticle surface is deformed. Accordingly, in the Tsuji et al. patent what is deformed or to be deformed is clearly the reticle. Applicants submit that the reticle in the Tsuji et al. patent is not an optical element in the meaning of the present invention recited in independent claim 51. Applicants further submit, therefore, that the Tsuji et al. patent

is not at all concerned about deformation of an optical element, in the manner of the present invention recited in that claim.

Still further, the Tsuji et al. patent relies on moving plural optical elements adjacent to the reticle to change the optical characteristics. This is in marked contrast to the present invention recited in independent claim 51. Applicants again submit, therefore, that there is nothing in the Tsuji et al. document that would teach or suggest providing an aspherical surface to reduce or compensate for a change in optical performance of an optical system, which may be caused by deformation of an optical element by the weight thereof, in the manner of the present invention recited in independent claim 51.

Applicants further submit that the remaining art cited does not cure the deficiencies noted above with respect to the Tsuji et al. patent.

The Lisson et al. patent relates to a method of testing or controlling a performance of an adaptive optic. Column 11, lines 17-24, of the Lisson et al. patent discuss that localized wavefront performance analysis can be used to determine, for example, actuator forces required to compensate for a deformation and to correct an imperfect surface. Applicants submit, therefore, that the Lisson et al. patent merely teaches that actuator forces are determined to compensate for the deformation. In turn, Applicants submit that there is nothing in the Lisson et al. patent that would teach or suggest providing an aspherical surface, such as an aspherical optical surface, to compensate for a change in optical performance, such as an optical characteristic produced or to be produced by deformation of an optical element due to the weight thereof, in the manner of the present invention recited in independent claim 51. Accordingly, the

Lisson et al. patent adds nothing to the teachings of the Tsuji et al. that would render obvious Applicants' present invention recited in independent claim 51.

The Examiner relies on the Swanson et al. patent merely for teaching an optical element having a step-like shape. The Swanson et al. patent, as with the remaining art cited, does not teach or suggest the salient features of Applicants' present invention, as recited in independent claim 51, which have been discussed above. Accordingly, that patent likewise adds nothing to the teachings of the remaining art cited that would render obvious Applicants' present invention as recited in independent claim 51.

For the foregoing reasons, Applicants submit that the present invention, as recited in independent claim 51, is patentably defined over the cited art.

Dependent claims 52-61 also should be deemed allowable, in their own right, for defining other patentable features of the present invention in addition to those recited in independent claim 51. Further individual consideration of these dependent claims is requested.

Applicants further submit that the instant application is in condition for allowance. Favorable reconsideration, withdrawal of the rejections set forth in the above-noted Office Action and an early Notice of Allowance are requested.

Applicants' undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should be directed to our address listed below.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Steven E. Warner", is written over a horizontal line.

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